ISCHEMIC RESPONSES IN THE RAT BARREL CORTEX IN VITRO AT DIFFERENT POSTNATAL AGES

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Anoxic depolarization (AD) is a hallmark of ischemic brain damage. In slices of the rat barrel cortex ischemia-like conditions induced by oxygen-glucose deprivation (OGD) evoke AD which manifests as a negative LFP shift and an increase in light transmittanceand resembles spreading depression (SD).AD typically initiated in one or more barrels and further spread across the entire slice with a preferential propagation through L4.

In the present study using simultaneous extracellular local field potential (LFP), optical intrinsic signal (OIS) and whole-cell recordings, we aimed to explorethe OGD-induced AD in slices of the ratbarrel cortex at different postnatal ages (P2-23).We found that OGD-induced ischemic response was not only delayed but also was qualitatively different in the neonatal (P2-6) rats. Ischemic response started with SD-like negative LFP shift associated with transient (~2 min) membrane depolarization of ~20 mV at a single-cell level and transient increase in transparency. Transition from SD to AD was characterized by complete but relatively slowly developing neuronal depolarization ~8 min after SD without any prominent extracellular LFP signal. Delayed AD was also associated with the second wave of transparency increase during OIS imaging. Thus, in contrast to adolescent (>P10) barrel cortex where SD and AD are united, these two processes are dissociated in time in the neonatal rats.

We hypothesize that this developmental differences in the ischemic response involves lower density of voltage-gated channels and synaptic connections, larger extracellular space and lower metabolic demand of immature neurons.

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THE SPECIFICITY OF THE REACTION OF THE CARDIOVASCULAR SYSTEM OF FIRST GRADERS TO PHYSICAL LOAD AT THE BEGINNING AND END OF THE ACADEMIC YEAR

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The study was run on the cardiovascular system in boys 8 years, enrolled in the 1st grade of a public school, in a state of relative rest, after a dosed dynamic load at

the beginning and end of the school year. The dynamic load during all periods of research caused change in the performance of the cardiovascular system.

Dynamic load resulted in an increase in the systolic arterial pressure of first-graders at the survey at the beginning of the school year. After veloergometry, there was a very significant link between minute volume and SBP ($r = 0.41$, $p < 0.01$), stroke volume and SBP ($r = 0.35$, $p < 0.05$). After isometric the connection between these indices was insignificant, but an inverse correlation was observed between the IOC and DBP ($r = -0.37$, $p < 0.01$). What is noticeable is that a significant shift in vegetative homeostasis towards the predominance of the sympathetic activity of the ANS after the isometric load of first-graders.

During the study of state of the cardiovascular system of first-year boys at the end of the school year, we found some reduction in systolic blood pressure compared to the beginning of the school year ($p < 0.05$). The stroke volume of blood at quiescent state exceeded the analogous valuesof this indicator fixed in the middle of the academic year. At the end of the academic year, dynamic and isometric loads led to various changes in the cardiovascular system of first-graders.

Dynamic load caused an increase of stroke volume and cardiac output after completion. Isometric load did not lead to similar changes of the stroke volume and cardiac output. After a dynamic load, we recorded reliable changes in systolic, diastolic and pulse pressure.

DEVELOPMENTAL CHANGES OF NO-ERGIC SYNAPTIC TRANSMISSION IN RAT SYMPATHETIC GANGLIA

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NO is one of the most important mediators of intracellular and intercellular interaction in the nervous, immune and endocrine systems. Autonomic neurons undergo restructuring of the mediator composition, and the electrophysiological characteristics of the neuronal activity change in postnatal ontogenesis. However, the age-related aspects of the synaptic transmission involving NO in the autonomic nervous system remain unclear.

The aim of the study was to study the effect of the donor and the inhibitor of NO on synaptic transmission in the sympathetic ganglia in postnatal ontogenesis.

Synaptic transmission in sympathetic ganglia was studied electrophysiologically in vitro. The cranial cervical sympathetic ganglion (SCG) was studied in rats of different ages (newborns, 10-, 20-, 30-, 60-, 180-day and three-year). The experiments were carried out according to the basic bioethical rules. The changes in the amplitude and duration of EPSP in the SCG was studied using electrical stimulation under the influence of the exogenous donor of NO – sodium nitroprusside (SN) and the blocker of NO synthesis (L-NAME) at a concentration of 100 μM.